

Inquiry Proposal to CALFED Program

July 28, 1997

Project Title and Applicant Name:

- PILOT PROJECT TO IDENTIFY "LEAST IMPACTED" AQUATIC HABITATS IN THE SAN FRANCISCO BAY-DELTA ESTUARY FOR FUTURE DEVELOPMENT OF BIOLOGICAL CRITERIA
- STATE WATER RESOURCES CONTROL BOARD

Project Description and Primary Biological/Ecological Objectives:

The Clean Water Act [Section 101(a)] requires that states "restore and maintain the chemical, physical, and biological integrity" of state waters. To achieve this, EPA recommends a three-tiered approach utilizing a combination of chemical specific standards-- using bioassay and toxicity tests to assess contaminant impacts on single species; physical criteria-- to maintain the integrity of the physical aquatic environment; and biological criteria-- to evaluate contaminant impacts on a thriving aquatic ecosystem. The integration of all three components is needed to maintain the ecological integrity of an aquatic ecosystem. Water quality standards in California are primarily based on chemical specific standards and toxicity standards, with no current implementation of biological criteria. While much research has been conducted to characterize the concentration of contaminants in sediment, water, and animal tissues, as well as to define survival thresholds in toxicity tests of single species, little is known about the impacts of contaminants on the structure and function of a healthy, thriving, biological ecosystem. While the use of biological criteria (BC) alone cannot "restore or maintain" water quality, integrating BC in California's water quality control efforts would serve to help evaluate ecosystem impacts based on representative, or "clean" habitats. The State Water Board proposes this pilot project to survey and assess the biological condition of the San Francisco Bay-Delta Estuary (the Estuary) with the intent to identify representative habitats and define "baseline" conditions. While toxic source control (prevention) is the preferred method to maintain good water quality, after impairment, preventing further adverse impacts becomes the goal. This proposal represents an essential first step toward preventing further degradation of the marine ecosystem by augmenting current water quality standards with biological criteria for estuarine and near coastal ecosystems. The justification for funding by CALFED is to assist the SWRCB in increasing water quality protections for migrating adult and smolt salmonids, Delta smelt, green sturgeon, and striped bass. Phase I proposes a region and statewide evaluation of biological criteria. Phase II outlines a pilot project to identify "least impacted" habitats in the the Estuary, on which biological criteria could one day be based. This project could serve to guide regional biological assessment efforts throughout the State and the Pacific coast region. This is a 3-year project with a total project budget of \$3,059,000. The Approach/tasks/schedule, Budget costs, and Cooperative partnerships are described under each phase and task identified below.

PHASE I: The SWRCB will establish a Biological Criteria Technical Advisory Committee to begin answering the over-arching questions about augmenting California's current water quality standards with biological criteria. The purpose of this TAC would be to assemble regional expertise from Pacific coast water quality programs including Oregon, Washington, and Canada who now utilize biological criteria. This TAC would compare and contrast issues, recognize and pool research resources, and share useful biosurvey data collected by adjacent states and regions with like marine ecosystems. This group would develop a plan and report of recommendations by which California would establish biological criteria (BC) to better evaluate water quality impacts in nearshore coastal and estuarine waters. This TAC would be responsible for determining the most appropriate standards and methods for data collection, analysis, and presentation. This TAC would also provide guidance as needed to other regional efforts, such as the San Francisco Estuary Biological Assessment Pilot Project discussed below. Participation in this 1-year TAC would include water quality specialists and biologists from SWRCB, the Regional Water Quality Control Boards, EPA, universities and federal and state agencies (USGS, USFWS, NMFS, CDFG, DWR), as well as a representatives of existing regional monitoring efforts such as the San Francisco Estuary Institute and the Southern California Coastal Water Research Project. In the interest of coordinating future efforts to establish biological criteria in regions statewide, the SWRCB would be the lead agency for this effort.

Budget costs for Phase I total \$137,000 and would include \$100,000 to support 1.0 SWRCB PY and travel costs for approximately 12 participants to 4 meetings in the San Francisco area for 1 year totaling \$32,000. Instate travel costs include \$18,000 for 9 participants at \$2,000/year. Out-of-state travel totals \$14,000 and includes \$4,000/yr each for 1-Oregon participant, and 1-Washington participant, and \$6,000 for one Canadian participant. Report preparation costs total \$5,000.

PHASE II: The San Francisco Estuary Biological Assessment Pilot Project

Task 1. The SWRCB will contract with the appropriate research entities (SFEI, CDFG, DWR, Regional Boards, etc.) to characterize and type the distinct habitats of the San Francisco Estuary. Defining and documenting individual habitat types within the San Francisco Estuary by their signature hydrological, physical, chemical, and biological characteristics is a first step toward better understanding this unique ecosystem, as well as identifying the characteristics of "clean", representative habitats on which to base biological criteria. The San Francisco Estuary Institute (SFEI) has developed specific typologies delineating wetlands (SFEI;1997), and is currently in the process of developing a benthic community typology for the Estuary (Thompson, et al.; 1996). CALFED has produced a preliminary habitat typology for instream habitats of the Sacramento-San Joaquin Delta. This task proposes to assess existing Estuary typology studies and build a database with this information as well as fill a gap for much needed research to

define and map the various habitat types of the Estuary. Except for a very general geographical delineation (Gunther; 1987), e.g., North, Central, and South Bay, no ecologically defined typology exists for the Estuary.

The final product of this 2-year task will be an Estuary typology database and a report that describes the various habitat characteristics and defines a habitat typology of the Estuary ecosystem by describing the hydrological, physical, chemical, and biological profiles of distinct habitats, as well as a series of maps showing approximate spatial/seasonal and other boundaries defining such habitats. This project has special relevance to CALFED, which is in the unique position of being able to help coordinate habitat typing efforts for the entire Bay-Delta watershed.

Total Budget costs are estimated at \$655,000 and include for \$250,000 to review existing data, build an Estuary typology database and include \$350,000 for new research costs. Report generation costs; \$5,000.

Task 2. The SWRCB will establish a San Francisco Estuary Technical Advisory Group (TAG) which will receive guidance from the Biological Criteria Technical Advisory Committee above, and which will identify the issues and challenges specific to the San Francisco Estuary, as well as provide the technical direction for research to be conducted in the SFE Biological Assessment Pilot Project. Participation in this TAG would include specialists in phytoplankton ecology, benthic ecology and chemistry, water chemistry and toxicology, and fish ecology and toxicology, with respective expertise in the resources of the North, Central and South Bay regions. The TAG would be responsible, given adequate resources, for identifying "least impacted", representative (baseline) habitats within the Estuary. This information has many potential uses, among them to define representative habitat conditions on which to base biological criteria. Among the challenging questions, the following would need to be addressed;

1) *How is a "least impacted" site to be defined for the Estuary?* Given the well-documented, natural, and highly variable fresh water flows and salinity regimes in the SFE, as well as the array of anthropogenic impacts of urbanization, defining the natural, physical baseline conditions will be difficult. Additionally, the introduction of over 230 different "exotic" species (Cohen; 1996) to the Estuary makes characterizing the natural, resident biological ecosystem reportedly impossible. However, ecological research in the Estuary continues to attempt to quantify variability (USGS; 1936-1997), and to document the dynamics of resident and nonindigenous species alike. US EPA (1992) asserts that baseline conditions must be based on both historical data and reasonable expectations about what can be achieved in resource management and water quality in the future.

2) *How should previous (and ongoing) research efforts which collected Estuary baseline data (SFEI, USGS, etc.), be incorporated into new biosurveys and biological assessments? How can this data be utilized to characterize "least impacted", representative estuarine habitats in the Estuary.* Currently information on representative estuarine sites in the Estuary is scattered among various private, academic and government sources. Identifying useful research and its contribution toward understanding the region is paramount. Also, bringing this information together in a useable, widely accessible format would benefit this and future research efforts.

3) *What are the "best" conditions under which to sample and collect baseline data for representative Estuary habitat types, as well as to conduct future evaluative sampling efforts?* The conditions under which baseline characteristics are to be documented must be defined, e.g., seasons of the year, in the presence or absence of long-term natural anomalies like early high Sierra snow-melts, drought, and El Nino. Parameters will need to be defined under the "best" conditions available in the Estuary on which to sample over the long-term for spatial and temporal research. This will not be a simple task for the high natural variability of the Estuary noted above, compounded with the significant anthropogenic impacts in the region and watershed. However, numerous states have defined biological criteria under difficult conditions. Addressing these questions would likely make baseline research conducted in the San Francisco Estuary a model for other highly variable and impacted ecosystems.

Products to be generated for Task 2 include a report; 1) identifying major issues and challenges facing all who seek to define baseline habitats in the Estuary, as well as recommendations in dealing with these; 2) providing recommendations to the SWRCB on gaps in existing research, and suggested subject areas and geographical areas in which biological assessments should be conducted; and 3) recommending standardized sampling, data collection and analysis for biological assessments and surveys for all research conducted in the Estuary. Total project time for Task 2 is 1 year. Total budget for Task 2 is \$40,500. This includes a facilitator for \$4,000 (1000/day for 4 days). Total travel costs are \$30,000 for 15 participants to meet in San Francisco, 4 meetings/year at \$500 ea. trip. Draft preparation costs; \$6,500.

Task 3: Based on the recommendations of the TAC and TAG, the State Water Resources Control Board will contract with the appropriate parties to have specific research and biological assessments conducted to identify and characterize "least impacted" habitats. The SWRCB will contract with the relevant agencies (SFP, SFEI, USGS, DFG, DWR Sea Grant, etc.) to conduct research to document the signature hydrological, physically, and biologically conditions of representative habitats of the Estuary. The project duration would be 2 years. Research costs would include extensive sampling, boat time, taxonomic analysis, statistical testing, and data processing. The final product will be a report that describes and maps designated habitats. Total budget costs are \$2,226,500. Costs include: 1- SWRCB PY at \$200,000 for 2 years; \$2,000,000 for research contracts for 2 years; and a "least impacted" habitat identification report estimated at \$6,500.